Translation

Method for Cleaning Drains for Fatty Waste Water

The invention relates to a method for cleaning drains for fatty waste water from households or industrial enterprises whereby nitrogenous compounds are added to the fat-reducing and/or fat-emulsifying bacteria contained in the water.

A method of the above described type is evident from EP-B-236 989, which, however, urgently requires the use of supplines, in form of nitrogenous compounds, for example. Said known proposal stems from the knowledge that micro-organisms have frequently specialized themselves to such a degree that they require supplines in order to live. Supplines are essential substances which are part of the basic material of a cell and which cannot themselves be synthesized by individual organisms. Involved are for example, amino acids, purines, pyrimidines, organic acids, carbohydrates, as well as vitamins, in particular involved are phenylalanine, arginine, asparinic acid, oxalic acid, malic acid, malonic acid and propionic acid. With respect to function and concentration, supplines clearly differ from nutrients. They correspond to vitamins in animal and human nutrition. The following compounds may be mentioned as nutrients which basically differ from supplines: Ammonia-, nitrate- and phosphate ions, glucose, polysaccharides, proteins and carbohydrates. For cleaning drains for fatty waste water from households or industrial enterprises, the addition of supplines for fat-reducing and/or fat-emulsifying bacteria, prevents formation of a plug and/or if a plug should already have been formed, its dissolution is easily effected. Within the framework of the known proposal, biological decomposition of the fat is achieved by the bacteria which are present in the waste water. Suppline combinations for

promotion of fat-reducing (and/or fat emulsifying) bacteria are applied alone or in combination with a detergent to the plug in the waste water pipe. The suppline combination facilitates rapid growth of the desired bacteria, which leads to a dissolution of the interfering fatty plug in the drain pipe. With respect to the fat-reducing and/or fat emulsifying bacteria, we are dealing with a broad spectrum of bacteria, which are normally contained in the waste water itself. In order to promote penetration of the supplines into the fat plug and to support the microbial dissolution of the fat, it is possible to add a detergent. The same purpose is served by addition of a CO_2-developing powder, either alone or in combination with the detergent, for example, an effervescent powder which consists of approximately 50% by weight of sodium bicarbonate and approximately 50% by weight of tartaric acid.

The above mentioned proposal has proven extremely valuable in actual practice, but requires refinement. Another method within the state of the art is apparent from DE 44 17 809 A1. Accordingly, a method is described for sanitary cleaning with a sanitary cleaning agent in liquid or solid form, which contains a minimum contents of germ-inhibiting organic substances, aside from the standard calcium dissolving water-soluble acids, germ-promoting organic substances and other additives, whereby for example, urea is contained as germ-promoting organic substance. This application discloses a two-stage effective system, according to which, in a first phase, the germ-inhibiting substances cause cleaning of the waste water and in a second phase, the germ-promoting substances cause cleaning of the waste water.

According to the teaching of EP 0 184 416 A2, a cleaning block for toilets is known, which is

dissolved in the flushing basin and which has a composition from 5 to 85 by weight of one or several anionic surface-active agents, 2 to 50% by weight of one or several agents for control of the solubility as well as 0.5 to 50% by weight of at least one water-soluble multivalent metallic salt, such as for example crystal water containing magnesium sulfate.

The methods according to the state of the art, however, do not provide satisfactory results. Therefore, it is desirable to improve the effect upon drain-blocking plugs and their parts in such fashion, that easier and more rapid physical as well as biological-chemical dissolution of plugs or their parts can be effected in the drain and the waste water. It has been shown, quite surprisingly, that the use of supplines, in particular of the above mentioned type, is not required if

1. the following are additionally added to a liquid drain cleaning agent:
   urea, a urea derivative, a salt of the urea and/or a salt of the urea derivative and
2. the following are additionally added to a solid drain cleaning agent:
   urea, a urea derivative, a salt of the urea and/or a salt of the urea derivative and/or waterless magnesium sulfate, whereby growth factors in form of supplines are largely excluded and a small amount of germ-inhibiting organic matter may be present.

Subject of the invention is consequently a method for the cleaning of drains for fatty waste water from households or industrial enterprises, whereby nitrogenous compounds are added to the fat-reducing and/or fat-emulsifying bacteria contained in the waste water, said method being characterized in that

1. to a liquid drain cleaning agent is/are additionally added urea, a urea derivative, a salt of the urea and/or a salt of a urea derivative and

2. to a solid drain cleaning agent is/are additionally added urea, a urea derivative, a salt of the urea and/or a salt of a urea derivative and/or waterless magnesium sulfate, whereby growth factors in form of supplines are largely excluded and in 1. and 2; the amount of germ-inhibiting organic substance lies below 0.5g/kg, preferably below approximately 0.3 g/kg, in particular below approximately 0.1 g/kg of drain cleaning agent.

The discussed addition in form of the germ-promoting organic substance can accordingly contain an open-chain or cyclical compound of the formula (I) $R_1R_2N\text{-}CO\text{-}NR_3R_4$, wherein R_1 to R_4 respectively are present independently from each other, in open chain form or cyclisized and may have the following importance: hydrogen, a lower alkyl group with 1 to 4 carbon atoms, a cyclo-alkyl group with 3 to 6 carbon atoms, an aryl group in form of a phenyl or naphtyl residue, an aralkyl group with 7 to 18 carbon atoms, or an O-, S, or N-containing heterocyclical group with 2 to 5 carbon atoms, whereby a compound of the formula (I) exists either wholly or partially in form of a salt.

The following urea derivatives shall be classified under the above formula (I):

$R_1R_2N\text{-}CO\text{-}N$ $N\text{-}CO\text{-}N$ and $R_1N\text{-}CO\text{-}NR_2$

In formula (I) the respective residues R_1, R_2, R_3 and R_4 are preferably hydrogen, since the corresponding starter compounds are commercially available and/or easier to produce. Suitable within the framework of the invention are in particular the substituents which are specified in the preceding definition of the invention. Being considered as lower alkyl groups with 1 to 4 carbon atoms are in particular the methyl-, ethyl-, n-propyl-, as well as the different isomers of the butyl group. Classified under the cyclo-alkyl group with 3 to 6

carbon atoms are, in particular, the cyclo-propyl-, cyclo-butyl-, cyclo-pentyl as well as the cyclo-hexyl residue, under the aralkyl group with 7 to 18 carbon atoms, in particular the benzyl- and phenethyl-group, under the alkylaryl group with 7 to 18 carbon atoms, in particular the tolyl group, as well as under the heterocyclical group with 2 to 5 carbon atoms in particular such in whose heterocyclical ring is present at least one oxygen, sulfur or nitrogen atom, whereby the radicals of oxirane, tetrahydrofuran, dioxane as well as pyran can be mentioned as suitable examples.

Basically, it is possible to employ the compounds of formula (I) also in form of their salts or other prior stages, which may promote solubility. In individual instances, this may then result in the desired solubility. Compounds may be considered, which will cause the release the compounds of Formula (I) only in watery medium, and/or unfold their effectiveness there. The specified quantities which follow always relate to the compounds of Formula (I) as such and/or their percentage within the appropriate derivatives and/or compounds.

Within the framework of the invention, among the named ureas and/or urea derivatives, suitable salts, randomly chosen, may be utilized if they do not interfere with the desired effectiveness mechanism. Given consideration for utilization are, for example, chlorides, sulfates, in particular hydrogen sulfate, phosphate, in particular the hydrogen phosphates. Especially effective is the urea phosphate. Urea phosphate in its pure form crystallizes, is colorless, has a melting point from 118 to 119^{o}C, is soluble in water, alcohol, acetic acid, glycerine, ethyleneglycol and similar. The watery solution reacts sour (1 percent solution pH-value 1.8). Aside from broad application as fertilizer (N/P source) it offers another beneficial practical application based on its acidic effect in soldering materials, melting flux agents, pickling agents, metal cleaning- and rust removing

agents and as catalyst for acid catalyzed artificial resins (compare page 1723, Roempp Chemie Lexicon, Publisher Thieme, volume 3, 1990 edition). There is no proposal within the state of the art for application as a solid or liquid drain cleaning agent for solving the aforementioned object, nor is there any pertinent suggestion to that end.

It is easily possible for the person skilled in the art to adjust the optimum amount of admixed material according to the invention, depending upon the respective application case. As preferred framework requirement, it might be specified that the urea be employed in an amount of approximately 0.1 to 20 percent by weight, in particular approximately 5 to 15 percent by weight, the urea phosphate in an amount of approximately 0.2 to 40 percent by weight, more particularly 2 to 30 percent by weight, and the magnesium sulfate in an amount of approximately 5 to 95 percent by weight, more particularly approximately 20 to 70 percent by weight in proportion to the solid material and/or the solid cleaning agent.

Core of the invention is, therefore, to admix to the solid or liquid drain cleaning agent, urea and its derivatives, among which are also its salts, such as for example urea phosphate, in particular also in connection with fat-reducing, protein-reducing and carbon-reducing enzymes and micro-organisms. In case of solid drain cleaning agent, it may be of benefit to additionally incorporate into same waterless magnesium sulfate. Based on its property profile, it may also find isolated application.

The present invention can technologically be explained as follows:

Urea and its specified derivatives, either as such or also in the form of salt, advance and promote - based on water-binding and swelling-enhancing as well as protein-dissolving properties - not only physically - the hydrophilization of plugs and their parts, but also their physical breaking apart and/or their dissolution. In addition, penetration and reduction capability of natural or admixed micro-organisms and enzymes is enhanced at the plug or its parts, accelerating thereby the biological-chemical decomposition, for example also in the waste water. At the same time, the growth factors (see above proposal according to EP-B-236 989) in form of supplines are largely omitted and/or replaced by the admixed substances according to Claim 1. It must come as a surprise that with elimination of the growth factors, there nevertheless occurs the desired technical success.

In addition, there is the further benefit that the percentage of environmentally harmful detergents can be reduced for dissolution of plugs. In case of the solid drain cleaning agent, the beneficially additionally employed waterless magnesium sulfate leads to a clear temperature rise at the plug as a result of strongly positive thermal value during dissolution in water. This promotes, for example, the physical break-up by melting the fatty substances and thereby facilitating their emulsification (for example by tenside addition). Furthermore, by means of the relationship of salt amount and water amount, optimal temperature conditions can be established for the biological/chemical decomposition, both at the plug as well as in the waste water. In contrast to the sodium hydroxide present in many drain cleaning agents, which likewise presents positive dissolution heat but is highly alkaline-caustic, waterless magnesium sulfate is a totally harmless, consumer- and environmentally-friendly neutral salt. Needless to say, it is obvious to the expert that the waterless magnesium sulfate can also be replaced by other waterless neutral salts, which correspond to the property profile of the magnesium sulfate, and that such salts thus develop in solid drain cleaning agents a novel effectiveness principle, which thus far is not found in the state of the art.

In the following, the invention is explained in more detail, making use of exemplary embodiments, but without constituting any limitation thereto.

Example 1 (Demolition of plug in the drain pipe)

The formulae applicable within the scope of the invention are evident from the following table comprising both liquid as well as powder-form variation.

Table

	Powder-Form Variation			Liquid Variation	
Substances	Example 1	Example 2	Example 3	Example 4	Example 5
Na-hydrogen carbonate	28	18	9		
Citric Acid, waterless	5		5		
Urea	5		5	5	10
Urea Phosphate		10	5		1
Mg-sulfate, waterless	50	60	75		
Solid Tenside	2	2		2	
Enzyme Complex	0.1		0.3		0.5
Lipase	0.1	0.3		0.3	
Fragrance, coloring	as required			as required	
Filler (NaCl)	ad 100g				
Filler (Water)				ad 100 ml	

To 0.5 g of the above specified mixture are added as detergent 3 g of dodecyl-sulfate and as CO_2-developing agent, an effervescent powder of 5g of sodium hydrogen carbonate and 5 g tartaric acid. 13.57 g of the mixture, which corresponds to the volume of one table spoon, is mixed with 900 ml of water and 100 ml of an earthy suspension (as source of bacteria) and added in a beaker to a cylindrical test sample (dia.32 ml; length 29 ml; weight 17 g) having the following components:

27% by weight of water, 3% by weight of hair, 10% by weight of Palmin (cocoa nut fat),

17% by weight of pigs fat, 20% by weight of coffee grounds, 6% by weight of tea leaves.

Addition of the combination (containing a detergent and an effervescent powder) to the cylindrical test specimen (fatty plug) is effected at a temperature of 15°C in a beaker. After several minutes the test specimen is affected to such extent that upon vigorous shaking or rinsing with water it is broken up (simulation of the rinsing thrust in a drain line).

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